

CLAIMS:

1. A composition comprising an activated citrus peel extract (ACPE) prepared by an activation method which includes exposure of citrus peels to at least one pathogen, said ACPE comprises at least one of the following: oligosaccharides,
5 short peptides, flavonoid glycosides, fatty acids, and triglycerides.
2. A composition according to claim 1, wherein said ACPE comprises a combination of all of the following: oligosaccharides, short peptides, flavonoid glycosides, fatty acids, and triglycerides.
3. The composition of claim 2, wherein said ACPE comprises at least 30-
10 60% oligosaccharides, 1-10% short peptides, 10-30% flavonoid glycosides, 5-15% fatty acids, and 5-15% triglycerides.
4. The composition of claim 2, wherein said ACPE comprises 50-60% oligosaccharides, 3-7% short peptides, 15-25% flavonoid glycosides, 8-12% fatty acids, and 8-12% triglycerides.
- 15 5. The composition of claim 2, wherein said ACPE comprises 55% oligosaccharides, 5% short peptides, 20% flavonoid glycosides, 10% fatty acids and 10% triglycerides.
6. A composition comprising an activated citrus peel extract (ACPE) prepared by an activation method which includes exposure of citrus peels to at least
20 one pathogen, said ACPE comprises 55% oligosaccharides, 5% short peptides, 20% flavonoid glycosides, 10% fatty acids and 10% triglycerides.
7. The composition according to any one of claims 1 to 6, wherein said at least one pathogen is a plant fungal pathogen.
8. The composition according to any one of claims 1 to 6, wherein said at
25 least one pathogen is a plant bacterial pathogen.
9. The composition according to any one of claims 1 to 6, wherein said at least one pathogen is a combination of plant pathogens.
10. The composition according to claim 7 wherein said plant fungal pathogen is *Penicillium digitatum*.

- 30 -

11. The composition of any one of claims 1 to 10 being a dermatological composition and further comprising a dermatologically acceptable carrier, excipient or diluent.
12. A dermatological composition comprising: (i) an activated citrus peel extract (ACPE) prepared by an activation method which includes exposure of citrus
5 peels to at least one pathogen, said ACPE comprises 55% oligosaccharides, 5% short peptides, 20% flavonoid glycosides, 10% fatty acids and 10% triglycerides and (ii) a dermatologically acceptable carrier, excipient or diluent.
13. The composition according to claim 11 or 12 adapted for the treatment of
10 skin conditions associated with a bacterial or a fungal infection.
14. The composition according to claim 13, wherein said bacterial infection is caused by bacteria selected from *Propionibacterium acnes*, *Enterococcus*, hemolytic *Streptococci*, *Staphylococci* and *M.R.S.A.*
15. The composition according to claim 13, wherein said fungal infection is
15 caused by a fungus selected from *Canis*, *Trichophyton*, *Mentagraphtes*, *Rubrum*, *Violaceum*, *Epidermophyton*, *Icrosporum* and *Candida*.
16. The composition according to claim 13, wherein said skin condition associated with a bacterial infection is selected from acne, cellulites, folliculitis, boils (or carbuncles), staphylococcal scalded skin syndrome, Erysipelas,
20 Erythrasma, Impetigo and Paronychia.
17. The composition according to claim 13, wherein said skin condition involving fungal infections is selected from ringworm, Candidiasis, Tinea Pedis and Tinea versicolor.
18. The composition according to claims 11 or 12 adapted for the treatment of
25 skin conditions not associated with a bacterial or a fungal infection.
19. The composition according to claim 18, wherein said skin is selected from diabetes related skin disorders, skin injuries, dermatitis, bed sores, dry skin, celluloses, corns, Keratosis Pilaris, psoriasis, pityriasis rosea and rosacea.
20. The composition according to claim 19, adapted for the treatment of a skin
30 condition related to diabetes.

- 31 -

21. The composition of any one of the preceding claims, wherein said composition is used as an antioxidant.
22. A method of treating a skin condition of a patient in need thereof, comprising applying to the skin an effective amount of the dermatologic
5 composition of any one of claims 11 to 21.
23. The composition of any one of claims 11 to 21 formulated as soap, lotion, hand cream, face cream, foot cream or a shampoo.
24. A lotion comprising: (i) an activated citrus peel extract (ACPE) prepared by an activation method which includes exposure of citrus peels to at least one
10 pathogen, said ACPE comprising at least one or a combination of the following: oligosaccharides, short peptides, flavonoid glycosides, fatty acids, triglycerides and (ii) a dermatologically acceptable carrier, excipient or diluent.
25. A shampoo comprising: (i) an activated citrus peel extract (ACPE) prepared by an activation method which includes exposure of citrus peels to at least
15 one pathogen, said ACPE comprising at least one or a combination of the following: oligosaccharides, short peptides, flavonoid glycosides, fatty acids, triglycerides and (ii) a dermatologically acceptable carrier, excipient or diluent.
26. A hand cream comprising: (i) an activated citrus peel extract (ACPE) prepared by an activation method which includes exposure of citrus peels to at least
20 one pathogen, said ACPE comprising at least one or a combination of one of the following: oligosaccharides, short peptides, flavonoid glycosides, fatty acids, triglycerides and (ii) a dermatologically acceptable carrier, excipient or diluent.
27. A face-cream comprising: (i) an activated citrus peel extract (ACPE) prepared by an activation method which includes exposure of citrus peels to at least
25 one pathogen, said ACPE comprising at least one or the combination of the following: oligosaccharides, short peptides, flavonoid glycosides, fatty acids, triglycerides and (ii) a dermatologically acceptable carrier, excipient or diluent.
28. A foot-cream comprising: (i) an activated citrus peel extract (ACPE) prepared by an activation method which includes exposure of citrus peels to at least
30 one pathogen, said ACPE comprising at least one or a combination of the

following: oligosaccharides, short peptides, flavonoid glycosides, fatty acids, triglycerides and (ii) a dermatologically acceptable carrier, excipient or diluent.

29. Use of an activated citrus peel extract (ACPE) for the preparation of a dermatological formulation for the treatment of a skin condition, said ACPE is
5 prepared by an activation method which includes exposure of citrus peels to at least one pathogen, and comprises at least one of the following: oligosaccharides, short peptides, flavonoid glycosides, fatty acids, and triglycerides.

30. Use of an activated citrus peel extract (ACPE) for the preparation of a dermatological formulation for the treatment of a skin condition, said ACPE is
10 prepared by an activation method which includes exposure of citrus peels to at least one pathogen, and comprises a combination of all of the following: oligosaccharides, short peptides, flavonoid glycosides, fatty acids, and triglycerides.

31. The use according to claim 29 or 30, wherein said ACPE comprises at least 30-60% oligosaccharides, 1-10% short peptides, 10-30% flavonoid
15 glycosides, 5-15% fatty acids, and 5-15% triglycerides.

32. The use according to claim 29 or 30, wherein said ACPE comprises 50-60% oligosaccharides, 3-7% short peptides, 15-25% flavonoid glycosides, 8-12% fatty acids, and 8-12% triglycerides.

33. The use according to claim 29 or 30, wherein said ACPE comprises 55%
20 oligosaccharides, 5% short peptides, 20% flavonoid glycosides, 10% fatty acids and 10% triglycerides.

34. Use of an activated citrus peel extract (ACPE) for the preparation of a dermatological formulation for the treatment of a skin condition, said ACPE is prepared by an activation method which includes exposure of citrus peels to at least
25 one pathogen, and comprises 55% oligosaccharides, 5% short peptides, 20% flavonoid glycosides, 10% fatty acids and 10% triglycerides.

35. A method for the treatment of a subject suffering from a skin condition, said method comprises contacting the skin of said subject with an effective amount of an activated citrus peel extract (ACPE), said ACPE is prepared by an activation
30 method which includes exposure of citrus peels to at least one pathogen, and

- 33 -

comprises at least one of the following: oligosaccharides, short peptides, flavonoid glycosides, fatty acids, and triglycerides.

36. A method for the treatment of a subject suffering from a skin condition, said method comprises contacting the skin of said subject with an effective amount
5 of an activated citrus peel extract (ACPE), said ACPE is prepared by an activation method which includes exposure of citrus peels to at least one pathogen, and comprises a combination of all of the following: oligosaccharides, short peptides, flavonoid glycosides, fatty acids, and triglycerides.

37. The method according to claim 35 or 36, wherein said ACPE comprises at
10 least 30-60% oligosaccharides, 1-10% short peptides, 10-30% flavonoid glycosides, 5-15% fatty acids, and 5-15% triglycerides.

38. The method according to claim 35 or 36, wherein said ACPE comprises 50-60% oligosaccharides, 3-7% short peptides, 15-25% flavonoid glycosides, 8-12% fatty acids, and 8-12% triglycerides.

15 39. The method according to claim 35 or 36, wherein said ACPE comprises 55% oligosaccharides, 5% short peptides, 20% flavonoid glycosides, 10% fatty acids and 10% triglycerides.

40. A method for the treatment of a subject suffering from a skin condition, said method comprises contacting the skin of said subject with an effective amount
20 of an activated citrus peel extract (ACPE), said ACPE is prepared by an activation method which includes exposure of citrus peels to at least one pathogen, and comprises 55% oligosaccharides, 5% short peptides, 20% flavonoid glycosides, 10% fatty acids and 10% triglycerides.

41. A method for the treatment of a subject suffering from a skin condition,
25 said method comprises contacting the skin of said subject with the lotion of claim 23 or 24.

42. A method for the treatment of a subject suffering from a skin condition in the scalp, said method comprises contacting the skin of said subject with the shampoo of claim 23 or 25.

43. A method for the treatment of a subject suffering from a skin condition, said method comprises contacting the skin of said subject with the hand-cream of claim 23 or 26.
44. A method for the treatment of a subject suffering from a skin condition,
5 said method comprises contacting the skin of said subject with the face-cream of claim 23 or 27.
45. A method for the treatment of a subject suffering from a skin condition, said method comprises contacting the skin of said subject with the foot-cream of claim 23 or 28.
- 10 46. The composition according to claims 1 to 10 being a composition for preserving foods, beverages and cosmetics.
47. A composition for use in preserving foods, beverages and cosmetics, said composition comprises an activated citrus peel extract (ACPE) prepared by an activation method which includes exposure of citrus peels to at least one pathogen,
15 said ACPE comprising one or more of the following: oligosaccharides, short peptides, flavonoid glycosides, fatty acids, and triglycerides.
48. A composition for use in preserving foods, beverages and cosmetics, said composition comprises an activated citrus peel extract (ACPE) prepared by an activation method which includes exposure of citrus peels to at least one pathogen,
20 said ACPE comprising a combination of all of the following: oligosaccharides, short peptides, flavonoid glycosides, fatty acids, and triglycerides.
49. A composition for use in preserving foods, beverages and cosmetics, said composition comprises an activated citrus peel extract (ACPE) prepared by an activation method which includes exposure of citrus peels to at least one pathogen,
25 said ACPE comprises 55% oligosaccharides, 5% short peptides, 20% flavonoid glycosides, 10% fatty acids and 10% triglycerides.
50. The composition according to any one of claims 46 to 49, wherein said foods and beverages are selected from meats, dairy products, water, soups, pastes, vegetable and fruit juices, chocolates, snacks, confectionery, flour based foods, tea,
30 coffee, alcoholic and carbonated beverages, vitamin complexes and health foods.

- 35 -

51. The composition according to any one of claims 46 to 49, wherein said cosmetics are selected from creams, shampoos, ointments, gels, lotions, and compositions for face masks.

52. The composition according to any one of claims 46 to 49, wherein said
5 composition is used as an antioxidant.

53. Use of an activated citrus peel extract (ACPE) for the preparation of a preservative composition, said ACPE being prepared by an activation method which includes exposure of citrus peels to at least one pathogen, and comprising one or more of the following: oligosaccharides, short peptides, flavonoid
10 glycosides, fatty acids, and triglycerides.

54. Use of an activated citrus peel extract (ACPE) for the preparation of a preservative composition, said ACPE being prepared by an activation method which includes exposure of citrus peels to at least one pathogen, and comprising a combination of all of the following: oligosaccharides, short peptides, flavonoid
15 glycosides, fatty acids, and triglycerides.

55. The use according to claim 54, wherein said ACPE comprises at least 30-60% oligosaccharides, 1-10% short peptides, 10-30% flavonoid glycosides, 5-15% fatty acids, and 5-15% triglycerides.

56. The use according to claim 54, wherein said ACPE comprises 50-60%
20 oligosaccharides, 3-7% short peptides, 15-25% flavonoid glycosides, 8-12% fatty acids, and 8-12% triglycerides.

57. The use according to claim 54, wherein said ACPE comprises 55% oligosaccharides, 5% short peptides, 20% flavonoid glycosides, 10% fatty acids and 10% triglycerides.

25 58. A method for preserving foods, beverages and cosmetics comprising applying to said foods, beverages or cosmetics an effective amount of activated citrus peel extract (ACPE), said ACPE prepared by an activation method which includes exposure of citrus peels to at least one pathogen, and comprising one or more of the following: oligosaccharides, short peptides, flavonoid glycosides, fatty
30 acids, and triglycerides.

59. A method for preserving foods, beverages and cosmetics comprising applying to said foods, beverages or cosmetics an effective amount of activated citrus peel extract (ACPE), said ACPE prepared by an activation method which includes exposure of citrus peels to at least one pathogen, and comprising a
5 combination of all of the following: oligosaccharides, short peptides, flavonoid glycosides, fatty acids, and triglycerides.

60. The method according to claim 59, wherein said ACPE comprises at least 30-60% oligosaccharides, 1-10% short peptides, 10-30% flavonoid glycosides, 5-15% fatty acids, and 5-15% triglycerides.

10 61. The method according to claim 59, wherein said ACPE comprises 50-60% oligosaccharides, 3-7% short peptides, 15-25% flavonoid glycosides, 8-12% fatty acids, and 8-12% triglycerides.

62. The method according to claim 59, wherein said ACPE comprises 55% oligosaccharides, 5% short peptides, 20% flavonoid glycosides, 10% fatty acids
15 and 10% triglycerides.

63. The method according to claim 58 or 59, wherein said foods and beverages are selected from meats, dairy products, water, soups, pastes, vegetable and fruit juices, chocolates, snacks, confectionery, flour based foods, tea, coffee, alcoholic and carbonated beverages, vitamin complexes and health foods.

20 64. The method according to claim 63, wherein said ACPE is applied to the foods, beverages and cosmetics prior to shipment or during manufacturing thereof.

65. The composition according to claims 1 to 10 being a biocide composition and further comprising a surfactant.

66. A biocide composition for cleaning and disinfecting, comprising a
25 surfactant and an ACPE prepared by an activation method which includes exposure of citrus peels to at least one pathogen, said ACPE comprising one or more of the following: oligosaccharides, short peptides, flavonoid glycosides, fatty acids, and triglycerides.

67. A biocide composition for cleaning and disinfecting, comprising a
30 surfactant and an ACPE prepared by an activation method which includes exposure

- 37 -

of citrus peels to at least one pathogen, said ACPE comprising a combination of all of the following: oligosaccharides, short peptides, flavonoid glycosides, fatty acids, and triglycerides.

68. The biocide composition according to claims 65 to 67, wherein said
5 surfactant is selected from nonionic and cationic surfactants.

69. The biocide composition according to claim 68 further comprising dyestuffs, perfumes, builders and corrosion inhibitors.

70. The biocide composition according to claim 69, wherein said nonionic
10 surfactant is selected from polyglycol ethers, polyalkylene glycol dialkyl ethers, and the addition products of alcohols with ethylene oxides and propylene oxides, or mixtures thereof.

71. The biocide composition according to claim 69, wherein said cationic surfactant is selected from quaternary ammonium salts.

72. The biocide composition according to any one of claims 65 to 71 for
15 cleaning and disinfecting of surfaces such as tiles, PVC, porcelain, stainless steel, marble, silver and chrome.

73. The biocide composition according to any one of claims 65 to 72 for removing grease, wax, oil, dry paint and mildew.

74. The biocide composition according to any one of claims 65 to 71 for use as
20 a laundry additive.

75. The biocide composition according to any one of claims 65 to 72 for use in poultry and animal husbandry.

76. A disinfectant towel comprising a cloth saturated with the detergent composition of any one of claims 65 to 75.

25 77. A disinfectant formulation in the form of an aerosol spray comprising the detergent composition of any one of claims 65 to 75 and a propellant and contained in an aerosol container under pressure.

78. A process for the preparation of an activated citrus peel extract (ACPE) comprising:

- 38 -

- (i) contacting citrus peels with spores of at least one fungal or bacterial pathogens, said pathogens being a 16 hour to 24 hour old bacteria or a 8 day to 14 old fungus,
- (ii) incubating said citrus peels;
- 5 (iii) extracting the peels with water, and removing the peels from the aqueous liquid thereby obtaining an aqueous extract;
- (iv) adjusting the pH of said aqueous extract obtained in step (iii) to a desired pH and concentrating the filtrate to obtain said activated citrus peel extract.

10 **79.** A process for the preparation of an activated citrus peel extract (ACPE) comprising:

- (i) contacting citrus peels with spores of at least one fungal or bacterial pathogens, said pathogens being a 16 hour to 24 hour old bacteria or a 8 day to 14 old fungus,
- 15 (ii) incubating said citrus peels;
- (iii) extracting the peels with water, and removing the peels from the aqueous liquid thereby obtaining an aqueous extract;
- (iv) adjusting the pH of said aqueous extract obtained in step (iii) to a first pH, filtering the solution through a membrane having a cutoff
- 20 between 800-2000 Da, readjusting the pH to a second pH and concentrating the filtrate to obtain said activated citrus peel extract.

80. A process for the preparation of an activated citrus peel extract (ACPE) comprising:

- 25 (i) contacting citrus peels with spores of at least one fungal or bacterial pathogens, said pathogens being a 16 hour to 24 hour old bacteria or a 8 day to 14 old fungus,
- (ii) incubating said citrus peels;
- (iii) extracting the peels with water, and removing the peels from the
- 30 aqueous liquid thereby obtaining an aqueous extract;

(iv) filtering said aqueous liquid through a membrane having a cutoff between 800-2000 Da and concentrating the filtrate to obtain said activated citrus peel extract.

81. The process according to claim 79 comprising:

- 5 (i) contacting citrus peels with 4×10^7 spores/ml of a fungal pathogen is 8-14 days old;
- (ii) incubating citrus peels at 25°C for 4 days;
- (iii) extracting the peels in water at 70°C for 2 hours, removing the peels from the aqueous liquid thereby obtaining an aqueous extract; and
- 10 (iv) adjusting the pH of said un-concentrated aqueous extract obtained in step (iii) to a first pH of 8-10, filtrating it through a membrane having a cutoff between 800-2000 Da, re-adjusting its pH to second pH of 3-5, and concentrating the filtrate to obtain said activated citrus peel extract.

15 82. The process according to claim 81, wherein said pathogens are selected from *Penicillium digitatum*, *Penicillium italicum*, *Phytophthora citrophthora* and *Pseudomonas syringae*.

83. The process according to claim 82, wherein said pathogen is *Penicillium digitatum*.

20 84. The process according to any one of claims 81 to 83, wherein said *Penicillium digitatum* is 10-12 days old.

85. The process according to claim 84, wherein said *Penicillium digitatum* is 10 days old.

86. The process according to claim 81, wherein said membrane having a cutoff
25 of 1000Da.

87. The process according to claim 81, wherein said first pH is 9 or 10 and wherein said second pH is between 3 and 4.

88. The process according to claim 87, wherein said first pH is 10 and wherein said second pH is 3.5.

– 40 –

89. An activated citrus peel extract (ACPE) obtainable by any one of claims 78 to 88.

90. An activated citrus peel extract (ACPE) obtained by any one of claims 78 to 88.

5

10

15

20

25

30